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NOTE

NYMPHAEA (NYMPHAEACEAE) IN BOLIVIA: NOTES ON SEVERAL SPECIES, THREE NEW COUNTRY RECORDS, AND A KEY TO SPECIES

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The most comprehensive floristic account for Bolivia is the checklist published by Foster (1958), however, no species of *Nymphaea* were included. Yet Wiersema's (1987) monograph of *Nymphaea* subgen. *Hydrocallis* included three species of *Nymphaea* as occurring in Bolivia: *N. amazonum* Mart. & Zucc., *N. gardneriana* Planchon, and *N. belophylla* Trickett (one locality). A fourth species, *N. glandulifera* Rodschied, was recorded by Haase and Beck (1989) from a single locality in an inundated savanna in northern Bolivia.

As part of an investigation of the biodiversity of aquatic plants in Bolivia, we have encountered three species of *Nymphaea* previously unknown for the country: *N. oxypetala* Planchon, *N. lingulata* Wiersema, and *N. jamesoniana* Planchon. Two additional species encountered, *N. belophylla* and *N. glandulifera*, previously known for Bolivia from single records, are briefly discussed. A key to all known Bolivian species is provided with the addition of *N. prolifera* Wiersema, an easily overlooked species anticipated as occurring in drier areas in southeastern Bolivia and already known from adjacent Paraguay. To date, all species occurring in Bolivia belong to subgenus *Hydrocallis* and are night-blooming.

SPECIES NOTES

***Nymphaea belophylla* Trickett.** *Nymphaea belophylla*, an extremely poorly known species, was thought to be restricted to the central regions of the Amazon and Orinoco basins (Wiersema

1987). The type locality is the Río Guaporé (also known as the Río Iténez) which forms the Brazil-Bolivian border, however the type material appears to be lost (Wiersema 1987). The new report of *N. belophylla* is from Laguna Cáceres in the Bolivian Pantanal on the border with Brazil. The discovery was not wholly unexpected as the species was recently listed for a nearby area of the Brazilian Pantanal by Pott and Pott (1997).

Nymphaea belophylla was encountered in an extensive, seasonally flooded plain adjacent to the channel of Río Sicurí, a few kilometers upstream from Laguna Cáceres. This area was contiguous with the lake during the rainy season and had a water depth of ca. 1.5–2 m at the time of the visit. The area was dominated by *Oryza rufipogon* Griffith and *Paspalum wrightii* Hitchc. & Chase. *Nymphaea belophylla* was scattered and occasional. The flowers, cut open, had a sweet, fruity scent; no fruits were observed.

VOUCHER SPECIMEN. BOLIVIA. Dept. Santa Cruz: Prov. German Busch, Río Sicurí, a few km above where it empties into Laguna Cáceres, elev. ca. 90 m, 18°54′5″S, 57°42′19″W, 20 Jul 1998, *Ritter, Crow, Garvizu & Crow 4655* (MO, NHA, USZ).

***Nymphaea glandulifera* Rodschied.** *Nymphaea glandulifera* is widely distributed in Central and South America (Wiersema 1987). Although this species was not listed for Bolivia in Wiersema's (1987) monograph, it had since been reported for the Llanos de Moxos, an extensive complex of seasonally inundated savannas in Central Bolivia (Haase and Beck 1989). Our report of a population of *N. glandulifera* at Mariposa represents the southernmost extension of its range. The site was a small pool occupying a wide section of a (seasonal?) stream. The plants were locally abundant and flowers were present.

VOUCHER SPECIMEN. BOLIVIA. Dept. Cochabamba: Prov. Carrasco, Mariposa, wetland on the northern side of the highway to Santa Cruz, ca. 1.5 km E of town, elev. 220 m, 17°00′39″S, 65°02′03″W, 5 Mar 1995, *Ritter 1642* (BOLV, MO, NHA).

***Nymphaea jamesoniana* Planchon.** *Nymphaea jamesoniana* is widespread throughout tropical and subtropical America (Wiersema 1987), hence, the report of its presence in eastern Bolivia on the Brazilian border in Parque Nacional Noel Kempff Mercado

was not unexpected. The site, Lago Caimán, was a long, fish-hook-shaped "bahía" (a lacustrine system which is connected with a nearby river during high water stages) associated with the nearby Río Iténez. *Nymphaea jamesoniana* was common, growing at depths of 1–2 m, and although the population was in flower at the time, we were able to collect only sterile material.

VOUCHER SPECIMEN. BOLIVIA. Dept. Santa Cruz: Prov. Velasco. Lago Caimán, elev. 200 m, 13°36′30″S, 60°55′36″W, 18 Apr 1996, *Ritter & Garvizu 3119* (NHA, USZ).

***Nymphaea lingulata* Wiersema.** *Nymphaea lingulata* was previously known only from northeastern Brazil (Wiersema 1987). This new report for Bolivia is from Laguna Volcan, a small (ca. 3 ha) lake in the foothills (elev. 1150 m) of the Andes in south-central Bolivia. The lake was dominated by *Potamogeton illinoensis* Morong and *P. gayii* A. Benn., with an adjacent marsh dominated by *Typha domingensis* Pers. and *Cyperus papyrus* L. Wiersema (1987) reported that fruiting in *N. lingulata* was known only from a single collection in Brazil; however, fruits have now also been collected in Guyana. Although the plant was abundant at Laguna Volcan and the population produced numerous flowers, no fruits were observed.

VOUCHER SPECIMENS. BOLIVIA. Dept. Santa Cruz: Prov. Florida, Laguna Volcan, SW of Estancia Angostura above the road to Santa Cruz, elev. 1150 m, 18°08′S, 63°39′W, 4 Feb 1996, *Ritter 2291* (MO, NHA, USZ, W); Laguna Volcan, 29 Jun 1997, *Ritter, Crow & Crow 4086* (NHA, USZ).

***Nymphaea oxypetala* Planchon.** *Nymphaea oxypetala* is known from relatively few sites. Its distribution had previously been thought to be limited to Venezuela, Ecuador, and southern Brazil, with uncertain records also listed for Cuba and Paraguay (Wiersema 1987). Our Bolivian collections extend the range to two areas in eastern Bolivia: (1) the Río Paraguá in Parque Noel Kempff; and (2) two populations in the Bolivian portion of the Gran Pantanal of Mato Grosso. *Nymphaea oxypetala* is unusual for the genus in that the leaves are almost always strictly submersed, although occasionally very reduced floating leaves are also produced. This may explain why this less-than-conspicuous species is known from so few localities. The floating, night-

blooming flowers of *N. oxypetala* have very acuminate perianth parts and the longest carpellary appendages of any *Nymphaea*.

At the Río Paraguá site, the plants were growing in a portion of the river adjacent to the village of Florida where the river margins were kept free of floating vegetation by human activities. A small population was present in depths up to ca. 2 m. The petioles appeared to be rather fragile, with many leaves broken off and floating in the area.

In the Pantanal site at Puesto Gonzalo, *Nymphaea oxypetala* was found growing in openings in floating vegetation mats and in areas where human activities kept the margins free of floating mats. Although locally abundant, no fertile individuals were observed. The other Pantanal population was encountered in the same general area as *N. belophylla* (as described above).

VOUCHER SPECIMENS. BOLIVIA. Dept. Santa Cruz: Prov. Velasco, Reserva ecológica El Refugio, a 300 m al E del campamento Toledo sobre el camino hacia el Río Paraguá, Barbecho anegado temporalmente, 14°42′32.7″S, 61°09′18.9″W, elev. 200 m, 16 May 1995, *Guillén & Medina 3723* (NHA, USZ); Prov. Velasco, Río Paraguá, alongside the community of Florida, elev. ca. 200 m, 14°36′55″S, 61°11′55″W, 22 Mar 1996, *Ritter 3003* (MO, NHA, USZ); Prov. Angel Sandoval, Puesto Gonzalo, along a side channel of the Río Pando near the Bolivian-Brazilian border, elev. ca. 90 m, 17°40′12″S, 57°46′53″W, 12 Jul 1998, *Ritter, Crow, Garvizu & Crow 4491* (MO, NHA, USZ), Prov. German Busch, Río Sicurí, a few km above where it empties into Laguna Cáceres, elev. ca. 90 m, 18°54′5″S, 57°42′19″W, 20 Jul 1998, *Ritter, Crow, Garvizu & Crow 4653* (MO, NHA, USZ).

KEY TO THE SPECIES OF *NYMPHAEA* IN BOLIVIA

1. Leaf blades sagittate, over 1.8 times as long as wide ... (2)
   2. Mature leaves mainly submersed; sepals and outer petals acuminate ..... *N. oxypetala*
   2. Mature leaves floating; sepals and outer petals rounded to acute ..... *N. belophylla*
1. Leaf blades suborbicular to elliptic, less than 1.6 times as long as wide ..... (3)
   3. Leaves with ring of pubescence at apex of petiole ..... *N. amazonum*
   3. Leaves lacking ring of pubescence at apex of petiole ... . (4)
      4. Only outer petals in tetramerous whorls, inner spirally arranged ..... (5)

5. Carpellary appendages lingulate-tapering, petals 8–14, tuberiferous flowers lacking; leaf blades uniformly green on upper surface . . . *N. lingulata*
5. Carpellary appendages clavate, petals 19–35, tuberiferous flowers usually present; leaf blades usually with purple flecks or blotches on upper surface (although not yet found, may occur in southeastern Bolivia) . . . . . *N. prolifera*

4. All petals in tetramerous whorls . . . . . (6)
6. Leaf blades lacking evident cross veins centrally, or if present very faint, the venation radiate, uniformly green on upper surface . . . . . *N. glandulifera*
6. Leaf blades with evident cross veins centrally, the venation weblike, often with colored markings on upper surface . . . . . (7)
7. Plants producing stolons throughout growing season; leaf blades usually mottled with rusty brown pigment, especially below; carpellary appendages 8–20 mm long . . . . . *N. gardneriana*
7. Plants not stoloniferous; leaf blades often with dark flecks on both surfaces; carpellary appendages 3–7 mm long . . . . *N. jamesoniana*

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